

# Adel Ardalan

## Curriculum Vitæ

Princeton Neuroscience Institute  
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### Current Positions

- 2021-Present Postdoctoral Research Scientist, Buschman Lab, Princeton Neuroscience Institute  
Mentor: Tim Buschman
  - Building a theory of rotational dynamics for brain computations
- 2021-Present Honorary Associate, Department of Kinesiology, University of Wisconsin-Madison  
Mentor: Brittany Travers
  - Analysis of movement data for diagnosis and treatment of motor challenges in youth with ASD

### Education

- 2018 Ph.D. in Computer Sciences, University of Wisconsin-Madison  
Dissertation Title: Large-Scale Information Extraction Using Rules, Machine Learning and Human Computation
- 2008 M.Sc. in Information Technology, University of Tehran, Iran  
Thesis Title: Bioinformatics Database Integration Using a Data Fusion Approach
- 2005 B.Sc. in Computer Software Engineering, University of Tehran, Iran

### Research Interests and Activities

- Computational cognitive and neurosciences
  - Building a theory of rotational dynamics for brain computations
  - Using computational geometry and topology for analyzing memory mechanisms and dynamics during visual decoding, simulated by recurrent neural networks
  - Studying persistent and dynamic coding schemes to accommodate storing multiple items in working memory
- Motor challenges in individuals with autism spectrum disorder (ASD)
  - Analysis of movement data for diagnosis and treatment of motor challenges in youth with ASD
  - Using pose estimation algorithms and computational pipelines to enable ecological and accessible gait assessment and monitoring, focusing on analyzing synchrony and balance in individuals with ASD
- Human-in-the-loop data analytics and information extraction with applications in data cleaning and integration
  - Hybrid machine-human value normalization for data cleaning with accuracy guarantee

### Publications

- C. J. Cueva, A. Ardalan, M. Tsodyks, N. Qian. Recurrent neural network models for working memory of continuous variables: activity manifolds, connectivity patterns, and dynamic codes. *arXiv:2111.01275*, 2021.

- D. R. Hocking, A. Ardalán, H. Farhat, A. Andoni, R. Lenroot, S. Kachnowski. Feasibility of a Low-cost Motion Capture and Virtual Reality-based Motor Intervention for Improving Gross Motor Skills in Youth with Autism Spectrum Disorder. *J NeuroEngineering Rehabil.*, 19(1), 2022.
- A. Ardalán, N. Yamane, A. K. Rao, J. Montes, S. Goldman. Analysis of Gait Synchrony and Balance in Neurodevelopmental Disorders Using Computer Vision Techniques. *Health Informatics Journal*, 27(4), 2021.
- J. M. Bain, A. Ardalán, S. Goldman. Deliberate Paradigm Shift in Research in Rare Neurodevelopmental Disorders. *Orphanet J. Rare Dis.*, 16:263, 2021.
- A. Ardalán, D. Paulsen, A. S. Saini, W. Cai, A. Doan. Toward Data Cleaning with a Target Accuracy: A Case Study for Value Normalization. *IEEE Intl. Conf. Big Data*, 2022 (Technical Report: arXiv:2101.05308).
- A. Ardalán, A. H. Assadi, O. J. Surgent, B. G. Travers. Whole-Body Movement during Videogame Play Distinguishes Youth with Autism from Youth with Typical Development. *Nature Sci. Rep.*, 9(1):20094, 2019.
- Y. Govind, P. Konda, P. Suganthan G. C., P. Martinkus, P. Nagarajan, A. Soundararajan, H. Li, S. Mudgal, J. Ballard, H. Zhang, A. Ardalán, S. Das, D. Paulsen, A. Singh Saini, E. Paulson, Y. Park, M. Carter, M. Sun, G. Fung, A. Doan. Entity Matching Meets Data Science: A Progress Report from the Magellan Project. *SIGMOD*, 2019.
- P. Suganthan G. C., A. Ardalán, A. Doan, A. Akella. Smurf: Self-Service String Matching Using Random Forests. *Intl. Conf. on Very Large Data Bases*, 2019.
- D. Mahajan, J. K. Kim, J. Sacks, A. Ardalán, A. Kumar and H. Esmaeilzadeh. In-RDBMS Hardware Acceleration of Advanced Analytics. *Intl. Conf. on Very Large Data Bases*, 2018.
- A. Doan, P. Konda, P. Suganthan G. C., A. Ardalán, J. Ballard, S. Das, Y. Govind, H. Li, P. Martinkus, S. Mudgal, E. Paulson, H. Zhang. Toward a System Building Agenda for Data Integration (and Data Science). *IEEE Data Eng. Bull.*, 41(2):37-49, 2018.
- P. Konda, S. Das, P. Suganthan G. C., P. Martinkus, A. Doan, A. Ardalán, J. Ballard, Y. Govind, H. Li, F. Panahi, H. Zhang, J. Naughton, S. Prasad, G. Krishnan, R. Deep, and V. Raghavendra. Magellan: Toward Building Entity Matching Management Systems. *SIGMOD Record*, 2018.
- A. Doan, A. Ardalán, J. Ballard, S. Das, Y. Govind, P. Konda, H. Li, S. Mudgal, E. Paulson, P. Suganthan G. C., H. Zhang. Human-in-the-Loop Challenges for Entity Matching: A Midterm Report. *Workshop on Human-in-the-loop Data Analytics*, 2017.
- P. Konda, S. Das, P. Suganthan G. C., A. Doan, A. Ardalán, J. Ballard, H. Li, F. Panahi, H. Zhang, J. Naughton, S. Prasad, G. Krishnan, R. Deep, and V. Raghavendra. Magellan: Toward Building Entity Matching Management Systems. *Intl. Conf. on Very Large Data Bases*, 2016.
- P. Konda, S. Das, P. Suganthan G. C., A. Doan, A. Ardalán, J. Ballard, H. Li, F. Panahi, H. Zhang, J. Naughton, S. Prasad, G. Krishnan, R. Deep, and V. Raghavendra. Magellan: Toward Building Entity Matching Management Systems over Data Science Stacks. *Intl. Conf. on Very Large Data Bases*, (demo), 2016.

- X. Chai, O. Deshpande, N. Garera, A. Gattani, W. Lam, D. S. Lamba, L. Liu, M. Tiwari, M. Tourn, Z. Vacheri, S. Prasad, S. Subramaniam, V. Harinarayan, A. Rajaraman, A. Ardalan, S. Das, P. Suganthan G. C., and A. Doan. Social Media Analytics: The Kosmix Story. *IEEE Data Eng. Bull.*, 36(3):4-12, 2013.
- A. Sangari, A. Ardalan, L. Lambe, H. Eghbalnia, and A. H. Assadi. Mathematical Analysis and Computational Integration of Massive Heterogeneous Data from the Human Retina. *Doctoral Conf. on Computing, Electrical and Industrial Systems*, 2012.
- A. Ardalan, E. S. Selen, H. T. Dashti, A. Talaat, and A. H. Assadi. Design and Applications of Intelligent Systems in Identifying Future Occurrence of Tuberculosis Infection in Population at Risk. *Doctoral Conf. on Computing, Electrical and Industrial Systems*, 2011.
- H. T. Dashti, A. Ardalan, A. F. Siahpirani, J. Tonejc, I. V. Uilecan, T. Simas, B. Miranda, R. A. Ribeiro, L. Wang, and A. H. Assadi. Pattern Recognition in Collective Cognitive Systems: Hybrid Human-Machine Learning (HHML) by Heterogeneous Ensembles. *Intl. Conf. on Artificial Intelligence*, 2010.
- H. T. Dashti, J. Tonejc, A. Ardalan, A. F. Siahpirani, S. Guettes, Z. Sharif, L. Wang, and A. H. Assadi. Applications of Machine Learning Methods to Quantifying Phenotypic Traits That Distinguish the Wild Type from the Mutant Arabidopsis Thaliana Seedlings During Root Gravitropism. *Intl. Conf. on Bioinformatics & Computational Biology*, 2010.
- A. Sabouri, A. Ardalan, and R. Shahidi-Nejad. Prediction of Protein Secondary Structure Based on NMR Chemical Shift Data using Support Vector Machines. *Intl. Conf. on Computer Modeling and Simulation*, 2010.
- M. Emadi, M. Rahgozar, A. Ardalan, A. Kazerani, and M. M. Arian. A Comparative Study of DTD-Independent XML Data Storage Approaches. In *Intl. CSI Computer Conf.*, 2006.
- M. Emadi, M. Rahgozar, A. Ardalan, A. Kazerani, and M. Ariyan. Storage Approaches for DTD-Independent XML Data. *Iranian Conf. on Electrical Engineering*, 2006.
- M. Emadi, M. Rahgozar, A. Ardalan, A. Kazerani, and M. M. Ariyan. Approaches and Schemes for Storing DTD-Independent XML Data in Relational Databases. *Trans. on Engineering, Computing and Technology*, 2006.

## Work Experience

- 2018-2021 Postdoctoral Research Scientist, Qian Lab, Zuckerman Institute, Columbia University  
Mentor: Ning Qian
  - Analyzing recurrent units' activities and connectivities in recurrent networks of firing rate units, to explain the mechanics of the retrospective Bayesian decoding framework for visual perception and working memory
- 2017 Lecturer, Department of Computer Sciences, University of Wisconsin-Madison  
Database Management Systems: Design and Implementation (CS 564)
- 2012-2018 Research Assistant, Department of Computer Sciences, University of Wisconsin-Madison  
Supervisor: AnHai Doan
  - Large-scale human-in-the-loop information extraction and integration
  - Attribute value extraction from product titles in e-commerce catalogs
  - Event extraction in the Twittersphere from legacy tweet stores

- 2011 Research Assistant, Department of Mathematics, University of Wisconsin-Madison  
Supervisor: Amir H. Assadi
  - Systems biology of Mycobacterium Tuberculosis for preventive and personalized medicine
- 2011 Research Assistant, Department of Computer Sciences, University of Wisconsin-Madison  
Supervisor: Christopher Ré
  - Machine reading project, slot filling task, feature extraction using logistic regression
- 2014 Summer Intern, @WalmartLabs, Mountain View, CA
  - Attribute value extraction from product titles in e-commerce catalogs, in collaboration with Product Classification and Segmentation (PCS) team
- 2018 Teaching Assistant, Department of Computer Sciences, University of Wisconsin-Madison  
Database Management Systems: Design and Implementation (CS 564)
- 2012 Teaching Assistant, Department of Computer Sciences, University of Wisconsin-Madison  
Introduction to Programming (CS 302)
- 2011-2012 Teaching Assistant, Department of Mathematics, University of Wisconsin-Madison  
Calculus I and II (Math 221 and Math 222)
- 2002-2009 Teaching Assistant, Department of ECE, University of Tehran, Iran  
Fundamentals of Databases, Database Laboratory, Artificial Intelligence
- 2020 Machine Learning Engineer, Biscuit & Chai, New York, NY  
Design and development of recommender system ensembles to provide geographically-aware venue and event recommendations
- 2009 Analyst and Developer, Payamafzar Peykasa, Tehran, Iran  
Building a multimedia messaging system for real-time application based on 3GPP/OMA standards
- 2007 Consultant, Iranian Power Market, Tehran, Iran  
Data modeling and database design
- 2019 Volunteer Computer Programming Facilitator, Girls Who Code, Zuckerman Institute, Columbia University
  - Working with students from Harlem high-schools on learning computer programming basics

## ■ Honors and Awards

- 2019 ACM Research Highlight Award, for the Article “Magellan: Toward Building Entity Matching Management Systems”
- 2018 SIGMOD Research Highlight Award, for the Article “Magellan: Toward Building Entity Matching Management Systems”
- 2004 Award for academic excellence, ranked in top 3 student GPAs, class of 2000, Electrical and Computer Engineering Department, University of Tehran, Iran
- 2003 Award for academic excellence, ranked in top 3 student GPAs, class of 2000, Electrical and Computer Engineering Department, University of Tehran, Iran
- 2000 Ranked 67 out of approximately 140,000 students taking the Iranian university entrance exam (zone #2)

## ■ Professional Services

- 2022 Reviewer, Cell Reports and PLoS Computational Biology
- 2021 Reviewer, Nature Scientific Reports and Autism Research

- 2017 External Reviewer, ACM SIGMOD 2018  
2016 External Reviewer, VLDB 2016  
2013, 2015 External Reviewer, The Journal of Supercomputing, Springer  
2013 External Reviewer, Data Engineering Bulletin Special Issue on Social Media and Data Analysis, IEEE Computer Society

## Technical Skills

- Programming languages and modeling tools: Python, Java, C++, Cython, HTML, JavaScript, SQL, Matlab, Git
- Data science tools: Pandas, TensorFlow, Pytorch, Scikit-learn, Jupyter, Matplotlib
- Distributed processing frameworks: Hadoop, Amazon Web Services, Google Cloud Platform, Condor
- Web development frameworks: Django Framework, Play Framework, D3.js
- Database management systems: PostgreSQL, MySQL, Oracle, Microsoft SQL Server
- Operating systems: Linux, Windows, Mac OS

## Personal Activities and Hobbies

- Music and Dance ○ Iranian traditional music – play Daf (Persian frame drum), Tambur (ancient middle-eastern lute), and perform in various venues and concerts  
○ Argentine tango
- Reading ○ Philosophy, sociology and semiotics (esp. works of R. Barthes)  
○ Literature, particularly Farsi poetry
- Workout ○ Running (finished Madison marathon 2016 and several half-marathons)  
○ Triathlon (finished Door County Half Ironman 2016 and 2017, and several sprint distance races)

## Languages

English, Farsi, Kurdish

## References

Available upon request